F·A·A·M facility for airborne atmospheric measurements

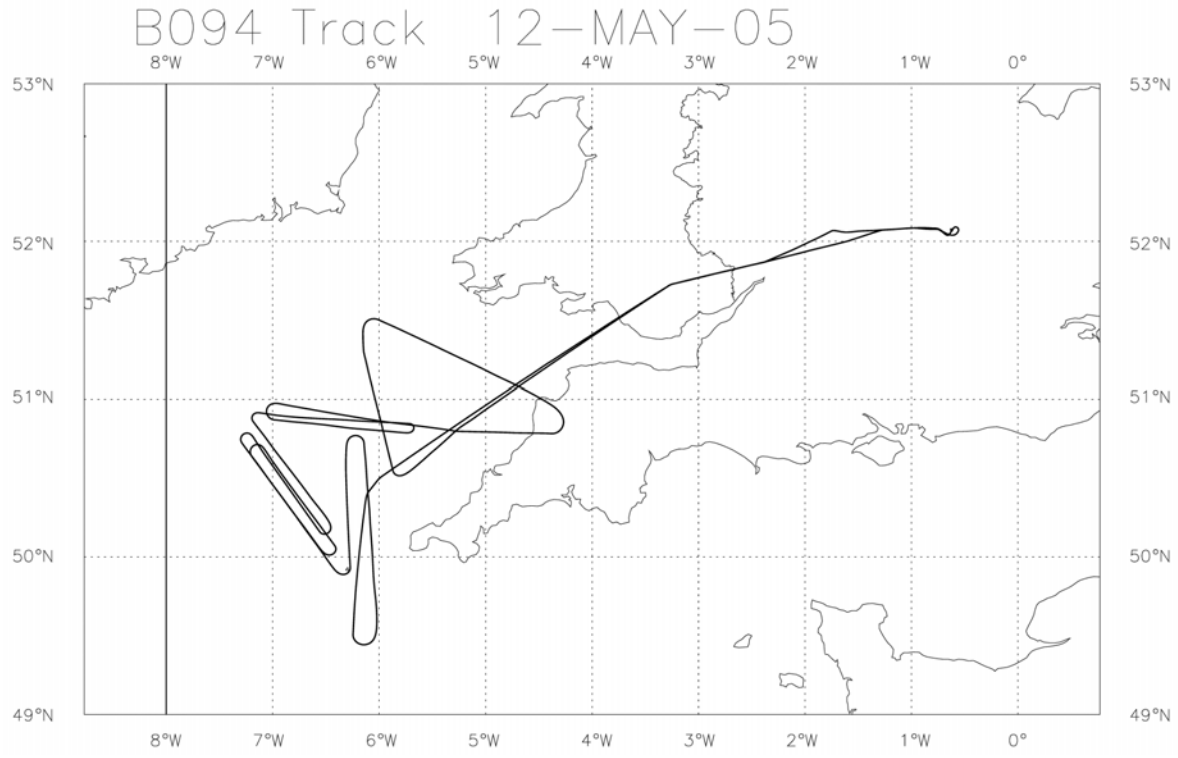
FLIGHT FOLDER

Flight No.:	B094
Date:	12 May 2005
Take Off	09:44:32
Landing:	14:32:32
Flight Time	4h48m00

Campaign: UTLS Cirrus 3
Trials Instructions: Cirrus
Operating Area: SW Approaches

POB	Position	Name	Institute
1	Captain	Alan Roberts	Directflight
2	Co-pilot	Alan Foster	Directflight
3	CCM	Sue Angold	Directflight
4	Aircraft Scientist	Keith Bower	University of Manchester
5	Flight Manager	Maureen Smith	FAAM
6	Flight Manager Training	Jim Crawford	FAAM
7	CCN	Paul James	FAAM
8	CCN Training	Jamie Trembath	FAAM
9	Core Chemist / CCM2	Doug Anderson	FAAM
10	Cloud Physics	Martin Pickering	Met Office
11	ADA/CPI	Mike Flynn	University of Manchester
12	ADA/CPI	Paul Connelly	University of Manchester
13	AMS	James Allan	University of Manchester
14	FWVS	James Bowles	Met Office
15	PTRms	Anne Hulse	UEA
16	WAS	Maria Nielsdottir	UEA
17	NOXY	Dave Stewart	UEA
18	NOXY	Andy MacDonald	UEA
19			
20			

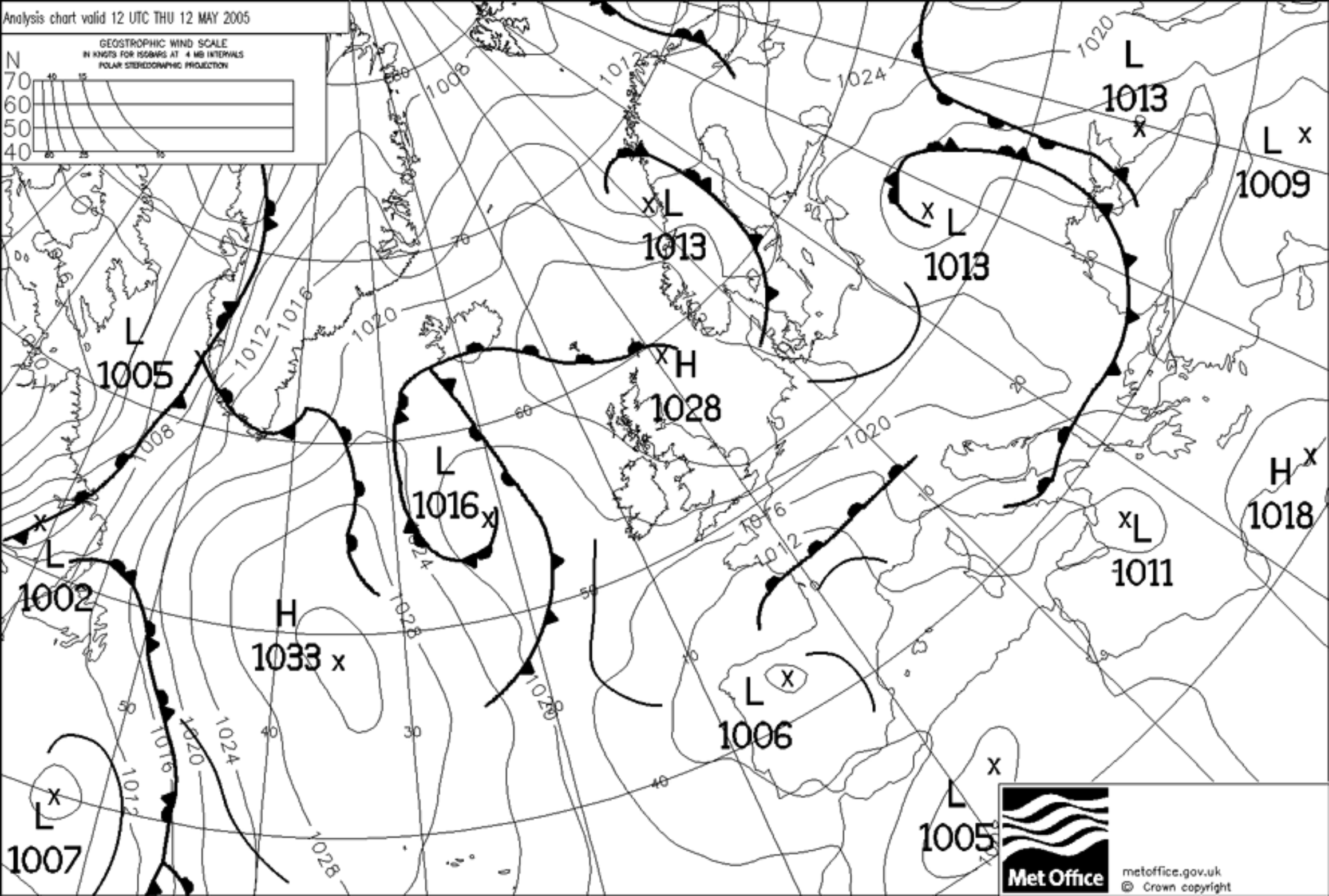
Flight Track:



FLIGHT SUMMARY

Flight No B094
Date: 12 May 2005
Project: UTLS CIRRUS3
Location: SW approaches

Start Time	End Time	Event	Height (s)	Hdg	Comments
091913		Start posn	0.06 kft	126	52'04.36N, 0'37.48W
092001		INU	0.06 kft	126	Set to Navigate
094432		T/O	0.69 kft	100	From Cranfield
095030		ASPs	6.0 kft	263	Open
095225		Videos	6.0 kft	251	FFC & RFC starts
102101	103744	Profile 1	18.0 - 31.0 kft	232	1000fpm
103909	104848	Run 1	31.1 kft	190	Above Cirrus
105329	110331	Run 2	27.1 - 27.0 kft	355	
110638	111639	Run 3	25.1 kft	186	
111822	112822	Run 4	23.0 kft	319	
113017	114109	Run 5	21.0 - 20.9 kft	140	
114254	115254	Run 6	19.0 kft	321	
115445	120540	Run 7	17.0 kft	140	
120727	121725	Run 8	15.0 kft	334	
121901	123239	Run 9	14.0 kft	102	Below cloud
123453	124402	Profile 2	14.0 - 23.0 kft	272	Interrupt
124613	125236	Profile 2	23.0 - 29.0 kft	099	
124650		Videos	23.6 kft	105	Change tapes
125236	130252	Run 10	29.0 kft	104	In cloud tops
130253	130510	Profile 3	29.0 - 31.0 kft	097	In cloud tops
130816	131017	Profile 3	31.0 - 33.0 kft	301	
131017	132019	Run 11	33.0 kft	295	
132214		contrail	29.1 kft	178	rfc
132335	133337	Run 12	25.1 - 25.0 kft	172	
133619	134619	Run 13	20.0 kft	051	
135023	140332	Run 14	11.0 kft	058	noxy cal
141113		asp closed	11.0 kft	067	
143232		Land	0.11 kft	307	Cranfield


Analysis chart valid 12 UTC THU 12 MAY 2005
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
L 1005
L 1002
L 1007
H 1033
L 1016
H 1028
L 1013
L 1013
L 1013
L 1009
H 1018
L 1011
L 1006
L 1005
1008
1012
1016
1020
1024
1028
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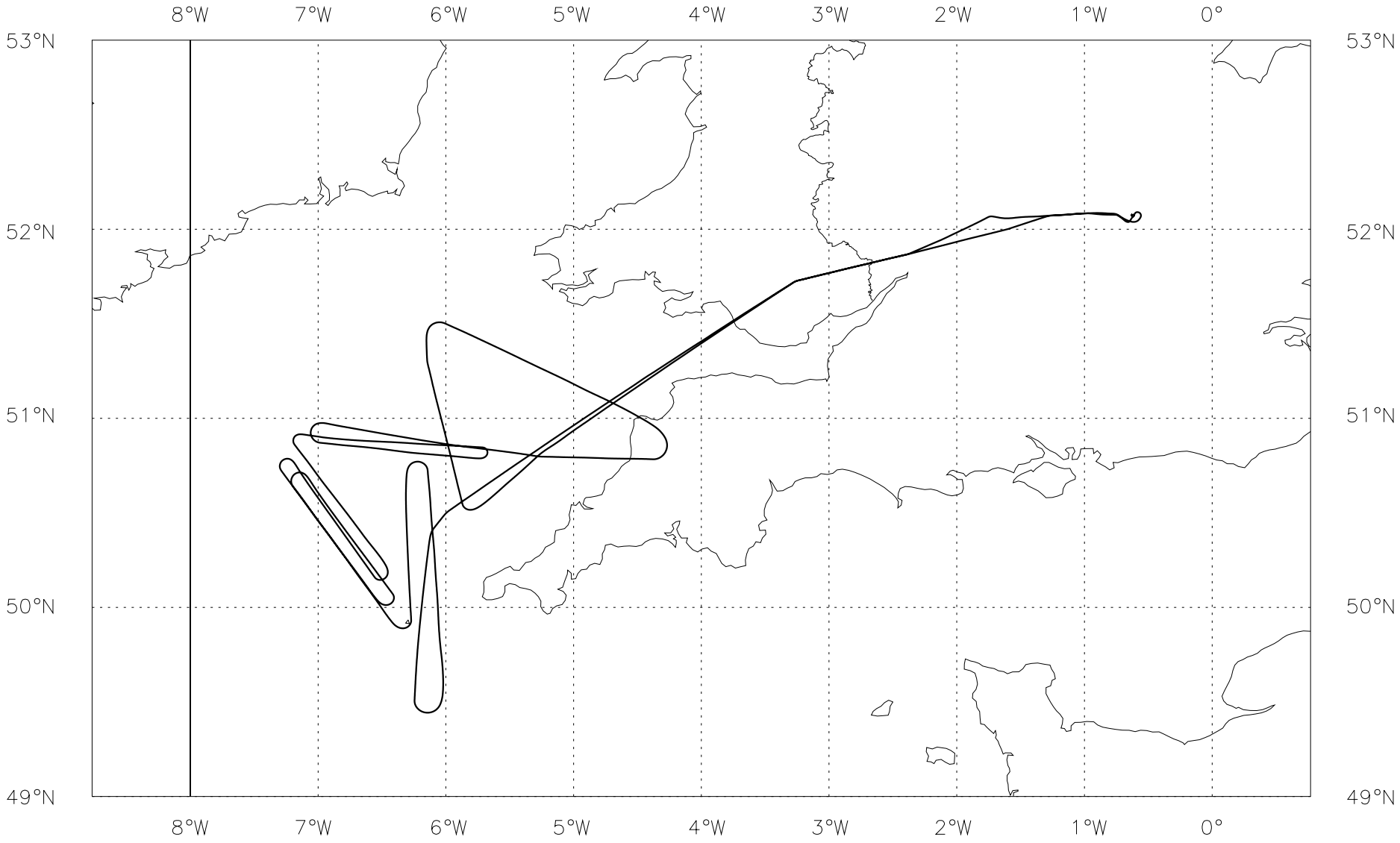
B094 Track 12-MAY-05



Sortie Brief UTLS CIRRUS 3 (Cirrus cloud microphysics and chemistry Option 1)

Flight Number B094
Date 12th May 2005 **Mission Scientist: Keith Bower**

Sortie Aims: To make measurements of the microphysics of cirrus clouds and their interaction with local aerosol and oxides of nitrogen. To investigate the effects of precipitation from the cloud on the vertical distribution of aerosol and oxidized nitrogen

Sortie Location: TBD In layers of cirrus cloud likely to be anthropogenically influenced.

Sortie Summary: The aircraft will initially make a vertical profile from well below cloud base to above the top of the cirrus. It will then make a series of straight and level runs of 10 minutes duration at several altitudes below, in and, when possible, above the cloud top. The straight and level runs above and below cloud will concentrate on determining the gaseous composition and aerosol physical and chemical properties of the air. Measurements of the vertical wind velocity will be made here. A straight and level run will be made very close to cloud base to determine whether supercooled water droplets or ice crystals are being activated.. Runs progressively deeper into the cloud will then be flown. SLRs will also be made in the fall streaks of the cirrus to characterise the precipitation in this region and to investigate the influence of the evaporation of the precipitation on the aerosol properties and trace gases in the region of the fall streaks.

Sortie Detail

a. T+0 Take off and climb to FL200 for transit to operating area (with appropriate time [~20mins] - spent at FL100 for NOxy calibration)
b. T+40 Perform vertical profile ascent P1 through cirrus from below cloud base to aircraft ceiling, or to above cirrus top whichever is the lower (at 1000ft/min).
c. T+60 Descend (not profile descent) to below base of cirrus generating cells and perform straight and level run (SLR) parallel to the mean wind direction 300 feet below cloud base for 10 minutes.
d. T+75 Turn through 180 degrees. Ascend to cloud base and perform straight and level run for 10 minutes just in cloud at the base of the generating cells. Deviations from the straight run may be made in order to penetrate generating cells provided such penetrations can be achieved with wings level.
e. T+90 Turn through 180 degrees ascend to middle of cloud and perform straight and level run for 10 minutes
f. T+105 Turn through 180 degrees and if possible ascend to above cloud top and perform straight and level run duration 10 minutes above cloud top
g. T+120 Descend to below cirrus base and make level runs through fall streaks adjusting flight path to pass through fall streaks as required.
h. T+135 Descend to lowest altitude reached by fall streaks and make and level runs through the residue.
(NB order of SLRs c-h may be changed by mission scientist to h-c if appropriate)
i. Repeat items b to h as time permits (including profile P2 to above P1 ceiling if failed to get above cloud top in P1)
j. T+260 return transit (with appropriate time spent at appropriate altitude for NOxy cal)
k. T+300 Land

Sortie Title UTLS Cirrus- Cirrus cloud microphysics and chemistry Option 1

Scientific Aims:

1. To measure the total number of Condensation Nuclei (CN), CCN*, IN* and the size distribution of optically active particles in clean and polluted air in the UTLS region over the UK. Assessment of their spatial distribution and their likely source based on tracer measurements and air mass history.
2. To quantify the extent to which air mass history, and gas and particle loading can affect the microphysical properties of cirrus clouds in the UTLS region, in particular, the size distribution, phase and morphology of cloud particles.
3. To obtain estimates of HNO_3 loss to cirrus clouds and the subsequent effect on the aerosol population after the cloud has evaporated using case studies involving one or more wave clouds.
4. To make observations of the number, size distribution, phase and morphology of droplets and crystals in cirrus cloud and the number and size distribution of interstitial particles and correlate these with measurements of tracers that identify anthropogenic influence. Hence building on objective 3 to investigate the influence of cirrus on the distribution of aerosol and gases in the UTLS region as cloud and precipitation evaporate.
5. To make an assessment of the chemical composition of the particulate in the UTLS region as a function of their size, their spatial variability and the effect different sources have on their composition.
6. To use measurements of the masses of key components as a function of size of cirrus particle dry residues and interstitial particles to determine if there are distinct chemical differences between activated and unactivated particles.
7. To establish the partitioning of oxidised nitrogen between the gas and aerosol phases as a function of air mass history and source region

Weather conditions

Cirrus cloud preferably associated with the polar front jet preferably over the UK.

Key Measurements

All instruments to be operated continuously.

1) Cloud Physics

- FFSSP, 2DC, 2DP, PCASP, SID-1 and SID-2. Normal monitoring to ensure correct operation. Operator should note particular features of interest eg. high concentrations, appearance of pristine ice crystal habits.
- ADA/CPI – as above
- CCN* - alleviator should be filled whilst in clear air either below, between or upwind of the cloud layer(s) of interest. 1 sample per run, if possible.
- Ice Nucleus counter* (INC) normally operated in clear air and under fixed conditions of temperature and supersaturation so as to maintain it in a stable condition. Allow additional time between runs for the operator to adjust it to a different set of conditions.
- J-W LWC and Nevzorov LWC/TWC. Where run is only partially in cloud and starts in clear, these should be zeroed/calibrated and logged by Flight Manager.
- TWC – initial profile should avoid cloud, if possible, to achieve good calibration.

2) FWVS – Switch off the lamp when frost point rises above -15C. Calibration should be performed following altitude changes.
3) WAS - 2 bottle samples per 10min flight leg unless otherwise notified by the Mission Scientist.
4) AMS - to be operated on Rosemount inlet. The inlet should be kept closed to avoid contamination whilst the GPU is operating prior to takeoff. It may be opened once the GPU has been removed. Similarly, intake should be closed before GPU is started post-flight.
5) Video – the default recording setup should be forward and rear. Flight manager or Flight Scientists should monitor rearward video and inform Mission Scientist of any occurrences of contrail formation (or cessation) and these should be noted in log sheets.

Mission Scientist's Log

Flight No **B**.094..... Date 12/05/05..... Page ...1... of ...4...

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
9:55:50		6000	231	51.9/1.6	climbing to FL100
					NO WAS bottle – valve problem – No gases left Ne
9:56.00		FL100			NOXY Cal started.
10:09:03	~~R1~~	FL100	252	51.7/3.2	Over Brecon – still in NOXY cal. p=696mb
					T=–7.11°C Td=–37.72°C @ 6m/s/107
10:14:00		FL100	232		Good Ci to SW ahead – distinct brown
					colouration at base of these clouds – looks good
10:15:58					NOXY cal complete
10:16:10					Climbing to FL200 for transit – not profile
10:18:25					Lands End –
10:23:05					FL200
10:23:30					2DC – Ice Xtals, CPI sees Columns ~~Small~~ IRREGULAR
10:27:00					Tephigram shows entry into cloud N 470mb
10:34:12	P1	29.9kft	229		Just coming from CT. – going P1 to FL310
10:37:44	P1 end	FL310			going S to get into position to start SLR
					parallel to wind
					AMS CPC – still working at
10:39:09	R1	FL310	50.3N 6.1W →	Heading 187°	T= –52.44 Td= –55.56 p= 286mb ff dd 10m/s/180° N–S
					CPI ADA – clear of particles
10:48:48	end R1	F	4	49.4N/6.2W	stopped – ~~Front~~ air space (Brest controlled space)
10:50:53					descending to FL290 – not profile
10:52.10		FL290			No cloud – down to FL270
10:53.24	R2	FL270			Start Run – going through very tops of cloud S–N
10:55.0		FL270			some convective elements – tops of Cu !! Out of Cu tops Now – above Ci
					1-2 ~~cm~~/litre SIDI
					CDI/2D – intermittent ~~Cloud~~ Cloud – Other end of run seemed to have higher CT.

Mission Scientist's Log

Flight No **B**.094..... Date 12/5/05..... Page 2.... of 4..

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
10.59:00	R2	FL270	358	50.2 N / 6.0 W	Running into higher CT & Ci here as we go N
					T = -46.21 Tdd = -43.31 ffdd 11m/s / 144°
11:03:31	R2 end	FL270		50.6 / 6.1	Descending to FL250 in S-N direction
11:06:38	R3 start	FL250	183	50.6 / 6.3	T = -40.75 Td = -38.56 11ms / 150° [N-S] Big Bullet rosette + SIR. on CPI
11:11:37	R3	FL250	179		ff dd Rm/s 150° ← wind backed – next SLX will be brought around to parallel
11:15:05	R3	FL250	176	49.9 / 6.2	CT lower again at Southern end, will turn and descend to do next SLR further N. BR, plate
11:16:39	end R3	FL 250			turnaway and descending to FL230
11:18:22	st R4	FL 230	322	49.9 / 6.4	8m/s 152° ffdd -35.34°C T -34.54°C Td [S-N]
					No B.R. More polycrystalline plates + IR (end RUN3 – BR, plate)
11:22:50	R4	FL 230	325		Cloud thinned – Gap in cloud – 3 photos L, A, K.
11:24:22	end R4	FL 230	324		end Run descend FL210 R Turn to do N-S leg.
11:30:17	st R5	FL 210	147	50.6 / 7.0W	p = 445mb 9m/s / 141 (-30.35 T / -28.34°C Td)
					2DC 2/libre, SID1 some shaft, in cloud low conc
11 32.50	R5	FL 210	145	50.5 / 6.9W	clear pocket cloud → dense patch visual
11:39:00	R5	FL 210	145		CPI all seeds (SIR Rosette, Poly Xtal Plate, Prism Plates Columns)
1:41:09 (11:40:50 KNB)	end R5	FL 210			end Run descend to FL190
11:42:54	st R6	FL 190	322	50.0 / 6.5W	-24.98°C / -23.06°C 8m/s / 161 deg.
11:52:54	end R6	FL 190			descend FL170
11:54:45	R7	FL 170			p = 526
11:58:31	R7	FL 170	146	50.5 / 6.4W	-20.93°C / -20.96°C 12m/s / 156° p526.
12:00:30	R7	FL 170	147		SIR – bits and pieces – CPI
	end R7	FL 170			2DC – high/low – cones image changing from to bar
12:05:40	end R7	FL 170		50.1 / 6.5	descending to FL150

Mission Scientist's Log

Flight No **B**.094.... Date 12/05/05..... Page 3 of 4

FAAM © 2004

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
12:07:27	st R8	FL150	331	50.2/6.4W	-17.89/-17.92 18m/s/121° 571mb
12:15:25					350 am3 PCASP - 1-2 images 2DC/2DP.
12:17:25	end R8	FL150	329	50.8/7.1	RT- descent FL140 — out of cloud. no bnd
12:19:01	st R9	FL140	102	50.9/7.0	-16.36°C -34.4°C 13m/s 131° streaks p594
12:24:00		FL140			rounded 1/R ~ 500μm - not many SIR/CPI
12:31:00	continue	R9 into FS	96		alter no particles - now in regions 2DC CPI particles
12:32:39	end R9	FL140		50.6/5.7	in full streaks/regions p594 -14.77
12:34:53	st P2	FL140-170	273	50.4/5.8	ascend to FL310 P2 (until all FL170)
					CB ker ~FL160
12:44:02	P2 int	FL230			through CT at FL230 turning on reciprocal direction / going right down into CI.
					AMS CPC ~500 intermittent high N 3000-15000
					at intermittent altitudes
12:46:13	P2 cont.	FL230 — ↑			poly Xbal plate + plates + SIR
12:48:01	P2	25.3kft	104	50.9/6.7W	375mb 12m/s/145°
					~~47.47.24~~ -44.95 -42.45°
12:49.59					Above CT now - stop P2 at FL280
12:51:30	R10 start				Going into more Ci - continue up to FL290
12:52:36	end P2 st R10	FL290	314	50.6/6.0	-51.21/-47.67 ? T/H 16m/s 162° above CT ?
					pocket protein plates - now BR. Not above CT
12:56:00		FL290			now well into BR. — CT getting higher
					↔ ft did 167° 16m/s
					looks like another thin layer above
13:02:53	Run 10 end-P3				FL290 - ascend FL310 to get above
13:05:10	end P3				end P3
13:07:50		FL310			still in cloud.

W-E

Mission Scientist's Log

Flight No **B**.094..... Date .....12/05/05..... Page ...4... of ...4...

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
13:08:16	P3 ream	FL310 ↑	298	50.9/4.4W	p 276 mb (-57.78, -54.6) looks like 330
13:10:17	end P3 st R11	FL330			CPI few Xtals — 2D clear above CT.
13:11:53	R11		295		
13:14:31	R11	FL330	295	51.2/5.2W	261 mb -55.6 Td -57.92 4m/s/212°
					there is some Ci above us — ahead of us (not yet 2D — not in cloud this run — CPI clear to
		FL330	295	51.4/5.9W	Add 4ms/22° -54.0 -58.65°C
13:20:19	end R11	FL330			turn left S → FL250 . photo at FL250
13:23:35	R12 start	FL 250	169	51.2/6.1W	Add 4m/s/168° (-40.27° -39.74°)
					small poly X plate - small crystals
					2DC - v small Xtals - conc ~ 0-2 per litre
					Clear patch AGAIN — HMM.
		FL 250	166	50.9/5.9W	375 mb — what has AMS seen?
13:28:54					SCu beneath cloud - not averaging required.
13:30:39					Visual - at/above CT. now - CT ↑ approaching
13:33:37	end R12	FL 250		50.5/5.8W	-39.1/39.8°C — will descend to FL200
13:36:19	R13 start	FL200	50	50.5/5.5W	FL200 Run — on way home *
13:46:19	end R13	FL 200	59	51.1/4.8W	-27.99 . 24.955 & 15.4/147°
					descending to FL110 — NOXY cals.
13:50:23	R14 start	FL110	59	51.2/4.2W	NOXY cal -8.61/-33.08°C 4m/s/112°
					p 669 mb
13:55:00	R14	FL110	56	51.4/3.8	-9.35/-36.52°C 13m/s/109 deg.
14:03:52	end R14	FL110	78	51.7/3.0W	NOXY cal completed.

* home ~ 3.30pm local - est.

CORE CHEMISTRY PRE FLIGHT LOG

PRE POWER UP	
All sample lines are connected to the rack	Y
All cylinders pressures are OK	Y
Ozone Span = 504, Offset = 50	Y

GAS PRESSURES	N_2 (bar)	CO_2 / Argon (bar)	CO standard (bar)
PRE FLIGHT	66	137	139
POST FLIGHT	57	135	139

POST POWER UP - GROUND				
Ozone Sample Flow 1 (LPM)	**Ozone Sample Flow 2 (LPM)**	**NO_x Sample Flow (LPM)**	**NO_x Ozonator Flow (LPM)**	**SO_2 Sample Flow (LPM)**
-	-	-	-	-
CO Time check against HORACE	**CO Lamp Flow (ml/min)**	**Pressure Monochromator (bar)**	**Pressure Cell (Torr)**	
-	-	-	-	

ZEROS							Average
Ozone (ppbV)	-	-	-	-	-	-	-
NO (ppbV)	-	-	-	-	-	-	-
NO_2 (ppbV)	-	-	-	-	-	-	-
NO_X (ppbV)	-	-	-	-	-	-	-
SO_2 (ppbV)	-	-	-	-	-	-	-

PRE FLIGHT COMMENTS

CORE CHEMISTRY CALIBRATION AND FLOW LOG

PREVIOUS CO CAL	Date and Flight Level	Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)
	11 May 2005 14:10:09 @ FL100	89.40	80.52	7198.04

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
10:06:48	FL100 (495-521)	86.53	80.52	6967.88	49.64	7.13
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.96	-	-	1.080	0.064	0.357
Time	**Flight Level**	**CO**				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
10:40:50	FL310 (485-495) Air vent cap on @ 10:38	82.16	81.20	6671.19	50.00	6.59
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.85	-	-	0.969	0.064	0.357
Time	**Flight Level**	**Remarks**				
10:45:00-10:45:09		CO valve switch gave values between 501 & 515 ∴ no need to do full cal				
Time	**Flight Level**	**CO**				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
10:56:42	FL270 (501-515)	80.49	81.29	6542.60	50.00	7.11
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.87	-	-	1.005	0.064	0.152
Time	**Flight Level**	**CO**				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
11:09:39	FL250 (air vent cap off 11:06:40, just pre R3)	79.90	81.93	6546.27	50.00	7.13
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.91	-	-	0.997	0.064	0.177
Time	**Flight Level**	**CO**				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
11:21:33	FL230	80.55	82.23	6623.79	50.00	7.13
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.90	-	-	1.003	0.064	0.202
Time	**Flight Level**	**Remarks**				
		CO valve switch gave value 532 ∴ no need to do full cal				
Time	**Flight Level**	**CO**				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
11:58:59	FL150 ()	82.13	81.87	6724.07	50.00	7.12
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_X Sample	NO_X Ozonator	SO2 Sample
		33.85	-	-	1.043	0.064	0.273

Time	Flight Level	Remarks
12:08:	FL150	CO valve switch gave value 523 ∴ no need to do full cal

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
12:22:27	FL140	82.56	82.00	6770.07	50.00	7.13
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample
		33.87	-	-	-	-	-

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
13:08:35	FL310 (P3 started just before cal completed)	80.95	82.40	6670.07	50.00	6.44
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample
		33.85	-	-	0.945	0.064	0.104

Time	Flight Level	Remarks
13:10:50	FL330	CO valve switch gave value 515-521∴ no need to do full cal

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample

Time	Flight Level	CO				
		Sensitivity (Hz/ppbV)	Bkgrd (ppbV)	Bkgd Cnt R (Hz)	Lamp Temp (°C)	Cell Press (Torr)
		Flows (LPM unless stated)				
		CO Lamp Gas (ml/min)	Ozone Sample 1	Ozone Sample 2	NO_x Sample	NO_x Ozonator	SO2 Sample

CORE CHEMISTRY FLIGHT LOG

GENERAL COMMENTS

CLOUD PHYSICS LOG

Flight No. B094 **Date: 24/05/05** **Operator: MAP** **Page 1 of 1**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
10:21:03	10	0.09	48	1							Start Profile 1 from FL180
10:21:59	15	0.08		1							FL190
10:22:54	25	0.09		1	1	300		80	200		FL200
10:23:50	5	0.11		5	2			100	200		FL210
10:24:44	5	0.28	49	20	10	200		Noise			FL220 Rearm 2DP to 1
10:25:47	5	0.35		20	2	300		Noise			FL230
10:26:50	10	0.23		20	7	300		Noise			FL240
10:27:45	7	0.23		70	10	200		Noise			FL250
10:28:55	15	0.11		10	3	200		Noise			FL260
10:29:57	10	0.11	50	5	1	200		Noise			FL270
10:31:56	2	0.2		100	22	250		Noise			FL280
10:33:32	40	0.5		30	40	200		Noise			FL290
10:35:24	10	0.1		1				Noise			FL300
10:37:45	15	0.1						Noise			End of Profile 1 @ FL310
10:39:11								Noise			Start Run 1 @ FL310
10:40:00	15	0.09						Noise			
10:42:00	15	0.09						Noise			
10:44:00								Noise			SID2 Computer reset!
10:46:00	15	0.09						Noise			
10:48:00	15	0.09						Noise			
10:48:48								Noise			End of Run 1
10:53:50								Noise			Start Run 2 @ FL270
10:54:00	15	0.09	51	100				Noise			
10:56:00								Noise			SID2 Computer reset!
11:03:31								Noise			End of Run 2
11:06:43								Noise			Start Run 3 @ FL250
11:07:00	160	0.7	52	100	35	800		Noise			
11:09:00	45	0.5	53	100	40	600		Noise			
11:11:00	110	0.8	56	200	135	800		Noise			
11:13:00	10	0.09	58	5	1			Noise			
11:15:00	150	0.8	61	100	30	400		Noise			
11:16:45								Noise			End of Run 3
11:18:22								Noise			Start Run 4 @ FL230
11:19:00	300	0.8	67	200	75	250		Noise			

CLOUD PHYSICS LOG

Flight No. B094 **Date: 24/05/05** **Operator: MAP** **Page 2 of 2**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
11:21:00	160	0.8	71	100	50	275		Noise			
11:23:00	25	0.35	72	70	10	375		Noise			
11:25:00	190	0.6	73	20	25	300		Noise			
11:27:00	90	0.4		90	55	550		Noise			
11:28:27								Noise			End of Run 4
11:30:19								Noise			Start Run 5 @ FL210
11:31:00	60	0.4	76	100	35	575		Noise			
11:33:00	95	0.45	76	100	110	500		Some images			
11:35:00	30	0.11	78	10	1	600		Some images			
11:37:00	70	0.35		100	25	650		Some images			
11:39:00	80	0.6	82	100	60	600		2000	600		
11:41:09											End of Run 5
11:42:56											Start Run 6 @ FL190
11:43:00	180	0.8	87	200	70	800		15000	800		Rearm 2DP to 16
11:45:00	240	0.9	93	300	200	800		28000	800		PCASP voltage loss?
11:47:00	25	0.13	100	20	10	800		2400	600		
11:49:00	25	0.25	101	20	10	650		5000	600		
11:51:00	50	0.4	102	100	30	800		4000	600		
11:52:55											End of Run 6
11:54:47											Start Run 7 @ FL170
11:55:00	150	0.5	106	200	60	800		9000	1000		
11:57:00	75	0.5	108	100	50	800		9000	800		
11:59:00	50	0.11	110	10	5	700		300	600		
12:01:00	25	0.14		5	1	600		300	600		
12:03:00	180	0.6	111	200	80	800		15000	800		
12:05:40											End of Run 7
12:07:28											Start Run 8 @ FL150
12:08:00	150	0.23	127	10	8	800		1500	800		
12:10:00	250	0.6	132	200	180	800		18000	1400		
12:12:00											SID2 Computer crash
12:16:00	300	0.09	135	5	1						
12:17:32											End of Run 8
12:19:03											Start Run 9 @ FL140

CLOUD PHYSICS LOG

Flight No. B094 **Date: 24/05/05** **Operator: MAP** **Page 3 of 3**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
12:20:00	300	0.09	135	1							
12:22:00	250	0.09		1	1	500		10			
12:24:00	200	0.09		1							
12:26:00	180	0.09		1							
12:28:00	160	0.09		1							
12:30:00	140	0.09		1							
12:32:41											End of Run 9
12:34:53	150	0.08		100	75	675		125	400		Start Profile 2 from FL140
12:36:00	330	0.6	137	200	25	800		1200	1000		FL150
12:37:00	160	0.15	138	100	25	675		1800	600		FL160
12:38:04	180	0.35	141	90	10	725		2200	400		FL170
12:39:06	130	0.5	142	150	50	750		6000	600		FL180
12:40:00	255	0.85	145	100	15	625		1800	400		FL190
12:41:01	150	0.65	147	80	12	800		2100	600		FL200
12:42:09	400	0.9	148	800	50	350		2700	400		FL210
12:43:10	15	0.09	149	10	2	200		50			FL220
12:44:03	12	0.11		1	1			75			FL230
12:47:16	25	0.3		100	20	275		2300	200		FL240
12:48:10	5	0.08		1	25	400		9000	200		FL250
12:49:07	75	0.44	150	10	1			10			FL260
12:50:09	10	0.19		10	1			Noise			FL270
12:51:25	10	0.10		1				Noise			FL280
12:52:35	10	0.14		10	10	300		Noise			End of P 2 Start Run 10 @ FL290
12:53:00	20	0.35		10	1	300		Noise			Rearm 2DP to 1
12:55:00	7	0.09		1	10	200		Noise			
12:57:00	100	0.9	152	400	300	350		Noise			
12:59:00	30	0.3	153	100	200	200		Noise			
13:01:00	30	0.5		200	275	450		Noise			
13:02:54	25	0.4	155	10	10	200		Noise			End of R 10 Start P 3 from FL290
13:03:50	120	0.85	156	100	210	200		Noise			FL300
13:05:12	10	0.35		90	40	200		Noise			End of Profile 3 @ FL310

CLOUD PHYSICS LOG

Flight No. B094 **Date: 24/05/05** **Operator: MAP** **Page 4 of 4**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
	PCASP Voltage dropped for 10 seconds, reasons unknown. Activity set to										
	Flowrate = 1.3, SEADAS set to 0.8 so reduce concentrations noted in this log										
	SEADAS time offset = 0										
	SID2 computer had multiple crashes with possible conflicts with Word 97										
	No Log taken at latter part of flight to stop conflicts.										

Flight No 8094

CCNC LOG

Exp. CIRRUS

Date 12/5/05

ALLEVIATOR GMT ON	ALLEVIATOR GMT OFF	Height feet	Dyn N/A	STATIC 1	2	3	4	5		REMARKS
		10000		1.75	2.5	3.5	4.25	5.5		
	Test on transit			0.54	0.79	1.17	1.53	2.17	S	
				831	766	809	808	765	D	
				691	684	659	650	619	B	
				2313	2332	2314	2291	2269	R	
				965.5	965.6	965.7	965.8	965.9	P	
10:39:10	10:40:10	31000	N/A	0.53	0.74	1.13	1.457	2.14	S	RUN 1
10:40				449	446	458	568	472	D	Cut short run.
				524	520	508	505	507	B	10:48:08
				2386	2344	2311	2291	2268	R	STATIC 5 OUTSIDE
				795.5	795.3	795.0	795.1	795.6	P	RUN TIME ALT NOT Chang
				1.75	2.5	3.5	4.25	5.5		
10:53:30	10:54:20	27000	N/A	0.5	0.74	1.11	1.46	2.10	S	RUN 2
				770	564	584	410	657	D	Cloud tops @
				521	502	520	508	[illegible]	B	495 beginning
				2256	2221	2254	2255	2315	R	of Run
				836.1	835.2	835.1	835.7	835.7	P	
11 06 38	11 07 25	25000	N/A	0.50	0.74	1.11	1.43		S	RUN 3
				508	571	1288	709		D	IN CLOUD
				523	507	562	527		B	USED FOR
				2358	2327	2305	2297		R	PRACTICE
				855.7	855.5	855.5	885.5		P	(RUN 4 still in cloud)
										23000
				1.75	2.5	3.5	4.25	5.5		
11:30:17	11:31:06	21000		0.5	0.74	1.12	1.45	2.12	S	RUN 5
				490	609	660	668	951	D	↓ Conc cloud
				501	502	498	499	504	B	20 Though ↓
				2395	2395	2845	2390	2370	R	Cloud @ start of run
				894.5	895.1	895.0	894.7	894.7	P	
11:42:58	11:43:35	14000		0.50	0.74	1.11	1.45		S	RUN 6
				506	528	486			D	LOOKS CLOUDY
					484	492	499		B	RUN ON DOD
				482	2312	2300	2292		R	OPON THROUGH
				2351	912.6	912.5	912.5		P	HScienhit told.
				912.5						

detector on FWPS power changes with pump on CCN
clips

Flight No B894

CCNC LOG

Exp. CIRELS

Problem w/ run calling.
had decided CCN
would call when finnished - NOT THE CASE!

Date 12/5/05

ALLEVIATOR GMT ~~PST~~ ON	OFF	Height	Dyn	STATIC 1	2	3	4	5		REMARKS
				1.75	2.5	3.5	4.25	5.5		RUN 7
11:54:47	11:55:26	17000	N/A	0.5	0.73	1.09	1.43	2.12	S	Still in cloud
				558	544	776	2083	2306	D	???
				480	486	486	521	705	B	
				2281	2283	2279	2277	2282	R	
				928.9	928.8	928.7	228.9	928.9	P	
12:07:30	12:08:20	15000		0.49	0.73	1.09	1.42	2.06	S	RUN 8
				599	744	500	1331	1092	D	
				483	490	498	498	569	B	
				2295	2306	2310	2320	2319	R	
				943.7	943.9	943.5	943.8	943.6	P	
				1.75	2.5	3.5	4.25	5.5		
12:19:04	12:19:44	13000		0.49	0.72	1.07	1.42	2.10	S	RUN 9
				768	1004	786	1070	1126	D	Clear sky
				481	497	528	546	608	B	
				2336	2345	2357	2363	2375	R	
				950.7	950.7	951	950.8	950.8	P	
12:52:38	12:53:24	29000		0.48	0.72	1.05	1.37		S	RUN 10
				688	632	651	647		D	Top of clouds
				514	518	516	516		B	abandoned,
				2458	2437	2429	2434		R	thin cloud
				816.9	817.7	817.5	817.0		P	layers.
				1.75	2.5	3.5	4.25	5.5		
13:10:20	13:11:09	33000		0.49	0.72				S	RUN 11
				731	1022				D	RAN OUT OF
				500	502				B	ROOM &
				2360	2353				R	TIME
				772.1	772.9				P	
13:23:38	13:24:24	25000		0.47	0.7	1.32	141		S	RUN 12
				483	411	807	1068		D	V. low conc of
				484	485	502	510		B	particles (ice)
				2323	2312	2305	2304		R	ran out of
				841.8	855.6	856.0	856.0		P	time

Flight No B094

CCNC LOG

Exp. _____

Date 12/5/05

Page__of__

ALLEVIATOR GMT		Height	Dyn	STATIC						REMARKS
ON	OFF			1	2	3	4	5		
13:39:10	13:39:49	20000		1.75	2.5	3.5	4.25	5.5		RUN 13
									S	
									D	IN CLOUD!!
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	
				1.75	2.5	3.5	4.25	5.5		
									S	
									D	
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	
				1.75	2.5	3.5	4.25	5.5		
									S	
									D	
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	

Flight Manager's Instrument Status Log

Flight No. **B**094 Date: 12/05/05

Instrument	Fitted	Operated	Instrument	Fitted	Operated
Navigation			**Cloud Physics**		
INU		**Y**	**Probes**		
GPS		**Y**	FFSSP	**Y**	**Y**
Satcom C		**Y**	PCASP	**Y**	**Y**
Satcom H		**Y**	2D-P	**Y**	**Y**
Thermometers			2D-C	**Y**	Y
De-Iced Temp		**Y**	Cloudscope	**N**	**N**
Non De-Iced		**Y**	SID 1	**Y**	**Y**
Heimann	**N**		SID 2	**Y**	**Y**
Hygrometers					
G. Eastern		**Y**	HVPS	**N**	
J. Williams		**Y**	CIP25	**Y**	**N**
Nevzorov		**Y**	CIP100	**Y**	**N**
TWC		**Y**			
FWVS		**Y**	**Racks:**		
Radiometers			INC	**Y**	**N**
Upper Clear	**Y**	**Y**	CCN / CNC	**Y**	**Y**
" Red	**Y**	**Y**	CVI	**Y**	**N**
" Silicon	**Y**	**Y**			
" JO1D	**N**		**Aerosol**		
Lower Clear	**Y**	**Y**	PSAP	**Y**	**N**
" Red	**Y**	**Y**	Nephelometer	**N**	
" Silicon	**Y**	**Y**	Filters	**Y**	**N**
" JO1D	**N**		AMS	**Y**	**Y**
Large Radiometers					
TAFTS	**N**				
MARSS	**N**				
DEIMOS	**N**		**Others:**		
ARIES	**N**		NIR TDLAS	**Y**	**Y**
SWS	**N**		2BT O3	**Y**	**N**
Chemistry			VACC	**Y**	**N**
Ozone	**Y**	**Y**	PEROXIDE	**Y**	**N**
ECGC	**N**		Formaldehyde	**Y**	**N**
NOX	**Y**	**Y**	ADA	**Y**	**Y**
CO	**Y**	**Y**	CPI	**Y**	**Y**
ORAC	**Y**	**N**	NOxy	**Y**	**Y**
PAN	**Y**	**N**	PTRMS		**Y**
PERCA	**Y**	**N**	Bag Sampling		**N**
WAS	**Y**	**N**			

Faults / Incidents Log

Flight No. B094
Date: 12/05/05

Instruments

1. Video – RFC display (camera) out of focus. Inboard display (vtr fault) switches off .
2. Core CNC – okay for 2.5hours then counts spiking to zero on HORACE. Raw data shows normal counts only apparent for about 6 to 8 seconds then jumps to 65535 for 8 to 12 seconds and continually cycling in that manner. Tried resetting instrument then restarting H_CNC to no avail.
3. ADA – no laser power.
4. WAS – no nitrogen in bottle pre-flight. Recharged it. After t/o gas pressure fell fairly quickly to zero. Leak in the hold?
   fixed after flight – plumbing snafu
5. PTRMS – failed
6. Noxy – nitric oxide occasional problems otherwise OK
7. FWVS – ok
8. Core Chem – ok
9. AMS – ok
10. cloud physics – overall ok
    PCASP lost laser power for 10 secs
    2DC ok
    2DP ok (not higher than fl200)
    FFSSP ok
    SID1 ok
    SID2 computer crash (x5)(software conflict?)

Aircraft

1. Intercom – pilot's didn't hear Flt. Managers calls pre-taxi. Seemed to sort itself out